An Integrated BS/MS Plan in Computer Science

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Abstract

We propose an integrated Bachelor's/Master's plan in computer science, designed to complete two degrees in a timely manner. This will be attractive and beneficial to our undergraduates and will help to enhance enrollment in our graduate program.

1 Introduction

1.1 General Goals

Computer science students have long understood the advantages of continuing their studies at the Master's level after completing their undergraduate education. Over the years, Master of Science (MS) graduates have often been offered positions of greater challenge and responsibility compared to the Bachelor's degree holders, and the MS graduates enter the workforce with a broader understanding of the field and the synergistic manner in which its various subfields interact. MS graduates who choose a Master's thesis option have found that research experience is particularly valuable, greatly deepening their insight and often leading to interesting research and development positions in industry.

However, in recent years, there has been a national downward trend in enrollment in graduate programs in computer science. For example, the March 1996 edition of *Computing Research News* reported a 25% decrease in applications for computer science graduate programs compared to the previous year. We at Davis have been observing this trend for the last several years, which has occurred in spite of our greatly increased recruiting efforts. In Fall 1997 we will have only 15 new graduate students, down from the 25-30 figure which was typical up until around 1991 or so.

Students still appreciate the advantages of a graduate degree as much as they did in the past. However, they find it difficult to ignore the considerable financial disincentives that the currently excellent job market implies for pursuing a graduate degree. Students perceive little long-term financial benefit to graduate study, and indeed see a short-term financial loss.

We can offer a much more attractive Master's program to our students if the economics of the situation is improved by allowing well-prepared students to complete a Master's degree in just one year instead of two. Thus we will propose here a combined Bachelor's/Master's plan whose MS portion is intended to be completed in one year past the student's Bachelor's work. For those students who finish the latter in the nominal four-year period delineated in the university catalog,

the two degrees would be completed in a total of five years.[1]

An additional advantage of offering the integrated BS/MS program is that it will help attract top undergraduates to Davis. Conversations with faculty at other University of California campuses with similar programs indicate that they are very attractive to students. At a Picnic Day exhibit set up by the UCD Department of Computer Science, high school students mentioned that UC San Diego offers a five-year BS/MS program, and asked whether UCD has a similar program. We have also had a number of inquiries from current undergraduates who had somehow heard that we were preparing a proposal.

We believe that industry will welcome the plan as well. Though demand for Bachelor's degree holders has fluctuated widely over the last 15 years, demand for Master's graduates has been consistently high.

1.2 Not a New Program

It should be kept in mind that *we are not proposing a new program*. Instead, we are merely requesting two variances to existing graduate policy which will facilitate finishing both Bachelor's and Master's work within a five-year time frame.

(a) We wish to reduce by 6 the formal class units required for these students to get a Master's degree.

(b) We wish to have students under the plan switch to graduate status immediately after completing their undergraduate work, even if that change would occur in a quarter other than Fall.

We feel that reducing the formal class units is sensible since our own students have a better mesh with our program and thus will need to take fewer background courses before starting their main class work. For b), it is our understanding that Graduate Studies has recently been allowing non-Fall quarter graduate admissions. Note that both of these variances occur at the graduate level; no changes are being proposed for Bachelor's curricula.

Under this plan, the student's Bachelor's degree will be earned through one of the three existing undergraduate majors in computer science (Computer Science; Computer Science and Engineering; Computer Engineering), while his/her Master's degree will be through the existing program offered by the Graduate Group in Computer Science.

Since we are requesting variances on existing policy rather than the development of a new degree program, in this document we will refer to a five-year BS/MS "plan," rather than to a five-year BS/MS "program."

2 The Proposed Plan

2.1 Plan Structure

The major points of our proposed plan are as follows.

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[1] Students will of course be informed that there will be no guarantees made to students in this regard, but they will be given advice and some help on how to achieve this goal. This issue is discussed further in Section 2.4.

- The student must satisfy the requirements of one of the following UCD Bachelor's programs: Computer Science; Computer Science and Engineering; Computer Engineering.

- The student must satisfy the requirements of the Graduate Group in Computer Science's Master of Science degree (either Plan I or Plan II) with the following modifications:

  Plan I 30 units of upper-division and graduate course work are required (rather than the 36 for normal plan I students).

  Plan II 6 units of 299 and 3 units of 290 or 290C can be used towards the 36 unit total (compared to only 3 units of 299 for regular Plan II students).

- The intended completion time for the combined plan will be five years.

2.2 Application Process

We will require a student to have at least junior standing to be able to apply. The students will complete standard application forms for the Master's program, plus some special forms for the combined plan. The latter will ask the student for a tentative quarter-by-quarter study plan for both their Bachelor's and Master's work, and will also ask the student to make a tentative choice between Plans I (thesis) and II (examination) of the Master's program.[2]

This study plan will specify the quarter in which the Bachelor's work is projected to be completed, with the conversion to graduate status occurring in the quarter immediately following. For the sake of illustration, consider a student applying to the integrated BS/MS program whose study plan specifies Winter 1999 as the quarter in which the Bachelor's work is to be completed. Then from Graduate Studies' point of view, procedurally the student's application would be equivalent to those of "ordinary" students who are applying to enter the MS program in Spring 1999.

Letters of recommendation will be required as usual. For students with GPA's above 3.5 we will waive the GRE, but it will be required (as for normal applicants) for those with GPA's of 3.5 or lower. The Admissions Committee of the Graduate Group in Computer Science will review the applications and make recommendations to the Graduate Division, just as with regular applicants to the Master's program. The same admissions standards shall be used for applicants to the combined plan as for the regular Master's program.

As there is no shortage of applications to our regular program from international students, we will target the new combined BS/MS plan to domestic students.[3]

2.3 Change to Graduate Status

Consider again the hypothetical student described above who is slated to complete his Bachelor's work during Winter 1999, who would attain graduate status at the beginning of Spring 1999. Computer Science advisers will make every effort to keep this student on schedule. However, if for whatever reason the student has not completed his Bachelor's work by Winter 1999, he will ask Graduate Studies for a deferral of one or more quarters. Note that this is what already occurs with regular applicants for graduate programs, if they fail to finish their Bachelor's work on time.

Thus, students in the integrated BS/MS plan will attain graduate status in the quarter following

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[2]See Section 2.4.

[3]Consistent with university policy, this includes both U.S. citizens and legal permanent residents ("greencard holders").

the completion of their Bachelor's work.[4] This provision is key to the students' ability to complete the integrated BS/MS program in a timely manner. Many of our undergraduate students finish their Bachelor's work in quarters other than Spring, particularly because we strongly encourage our undergraduates to take six-month "co-op" positions in industry at some point during their Bachelor's studies.

We anticipate employing most students as Teaching or Research Assistants immediately upon their attaining graduate status.

2.4 Mechanisms to Facilitate Timely Completion of the Program

It will be made clear to students that there cannot be any guarantee that they will finish the combined BS/MS plan in five years, just as the sample four-year course schedules we distribute to our undergraduates do not imply any guarantee of finishing the Bachelor's degree in four years. We do believe that most students will be able to complete work for the Master's degree in just one year's additional time beyond their Bachelor's degree (whether the BS degree is completed in four years or not), due to the structure we have designed here and due especially to the fact that most students in the combined degree plan will be self-selected by a desire to finish in a timely manner. We have had a few students in the past who, due to requirements of their employers, needed to complete an MS degree within one year's time, and they were able to do so, even without the advantage of the reduced unit requirement which we are offering within the plan proposed here.

To facilitate timely completion of the integrated degree plan, the following mechanisms will be used:

- The reduced units for Plan I and greater unit flexibility for Plan II will help timely completion of the plan, in the obvious way.

- As described earlier, a student will attain graduate standing in the quarter immediately following the quarter in which he/she completes the Bachelor's portion of the plan.

- The Department of Computer Science will commit itself to giving course enrollment priority to all undergraduate students admitted under the combined plan. Given the long waiting lists our undergraduate courses have had in recent years, this is a very significant incentive.[5]

- The applicants will submit a quarter-by-quarter study schedule for both the Bachelor's and Master's degrees. Such early planning, though of course subject to change, should facilitate a student's timely completion of the integrated degree plan.

  The application form will also ask the student to make a tentative choice between Plans I (thesis) and II (examination) of the Master's program. The most straightforward approach to finishing the combined BS/MS degree plan in five years would be via Plan II, and a sample schedule for Computer Science and Engineering majors under Plan II is included in Appendix 4.

  On the other hand, we strongly believe that the Plan I option is the one providing the greater academic benefit to Master's students in general. For a student anticipating Plan I, we will

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[4]The student is awarded a Bachelor's degree at that time, rather than being awarded BS and MS degrees simultaneously later on.

[5]Note, though, that students in the combined plan will receive priority only relative to other students in the same major and same class standing. In other words, a senior not in the plan would still have enrollment priority over a junior who is in the plan. We assume that the total number of students in the plan will be at most a dozen per year, probably considerably less; thus implementation of priority for the students in the plan could be done individually, rather than needing any automated mechanism within the RSVP enrollment software.

make efforts to match him/her to an appropriate Graduate Group faculty member. Since a number of our undergraduates already work on our research projects during the summers, a Plan I student may finish most of the research work for a thesis before the beginning of his/her fifth year, leaving only the writing stage. With careful scheduling, Plan I students also have an excellent chance of meeting the nominal five-year target.

3 Transfer to the Ph.D. Program

If a student in the combined BS/MS plan wishes to transfer to the Ph.D. program and already has reached graduate standing, he or she will apply for the transfer using the same process as for regular MS students.

4 Sample Five-Year BS/MS Schedule

The freshman-senior portion of the sample schedule below is as appears in the literature we currently distribute to our Computer Science and Engineering majors. We have added to this a fifth year for the graduate work. Note that the latter year consists of three courses per quarter, which is actually the standard for all of our first-year graduate students.

	Fall	Winter	Spring
Freshman	Math 21A	Math 21B	Math 21C
	ECS 30	ECS 40	Physics 9A
	Chem 2A or 2AH	Unrestr Elec	ECS 50
		HSS/GE Elec	HSS/GE Elective
Sophomore	Math 21D	Math 22A	Math 22B
	Physics 9B	Physics 9C	Physics 9D
	Engineering 35	Engineering 45	Engineering 17
	ENL 1, 3 or Comp		HSS/GE Elective
	Rhetoric 1 or 3		
	Lit 1, 2, or 3		
Junior	ECS 100	ECS 140A	EEC 180A
	ECS 110	ECS 154A	ECS 122A
	Stat 131A	EEC 100	ECS 154B
	HSS/GE Elective	HSS/GE Elective	HSS/GE Elective
			UD English (exam or course)
Senior	ECS 150	ECS 160	Engineering 190
	ECS 152	EEC 172	Computer Elective
	Computer Elective	Computer Elective	Computer Elective
	HSS Elective	HSS Elective	
Graduate	ECS 222A	ECS 240	Grad Elective
	ECS 250A	ECS 251	Grad Elective
	ECS 120	Grad Elective	Grad Elective
			ECS 299 (exam prep)